

In the Claims:

1. (Twice Amended) A method for etching a pattern on a workpiece, comprising:

selecting a workpiece with a hard mask deposited over a layer to be etched, which hard mask is comprised of a reactive metal, the hard mask further defining a pattern including at least one portion having a critical dimension;

oxidizing the hard mask in order to harden the hard mask; and

processing the workpiece in a reactor by exposing the entire hard mask to an etch;

whereby the layer is etched corresponding to the pattern of the hard mask, and the growth of the layer during the etch is minimized in the portion of the layer corresponding to the critical dimension.

42. The method of claim 1, wherein:

said selecting step includes selecting a workpiece having a hard mask, which hard mask comprises of one of titanium, aluminum, and tantalum.

43. The method of claim 1, further comprising:

exposing the hard mask to a stream of oxidizing gas in the reactor prior to said etch step.

44. The method of claim 1, further comprising:

exposing the hard mask to a stream of oxidizing gas in the reactor during said etch step.

45. The method of claim 1, further comprising:

exposing the hard mask to an oxidizing stream comprising of one of oxygen, nitrogen, fluorine, boron, and carbon gas, and any combination of oxygen, nitrogen, fluorine, boron, and carbon gas, in the reactor prior to or during said etch step.

46. The method of claim 1, wherein :

said selecting step includes selecting a workpiece with a lithographic layer covering the hard mask.

47. The method of claim 1, wherein:

said selecting step includes selecting a substrate having a hard mask which is readily oxidizable.

48. The method of claim 1, wherein:

said selecting step includes selecting a substrate with a hard mask, which hard mask is comprised of a metal with a low sputtering yield.

49. The method of claim 1, further comprising:

exposing the hard mask to a stream of oxidizing gas in the reactor prior to or during said etch step in order to oxidize the surface of the hard mask and thereby slow down an etch rate of the hard mask.

50. The method of claim 1, wherein:

said selecting step includes selecting a hard mask (1) on which has been or (2) on which can be developed at least one of an oxide, nitride, fluoride, boride and carbide.

51. (New) A method for etching a pattern on a workpiece, comprising:

selecting a workpiece with a hard mask deposited over a layer to be etched, which hard mask is comprised of a reactive metal and defines a pattern including at least one portion having a critical dimension;

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allowing the hard mask to react with etch process gases in order to harden the hard mask;
and
processing the workpiece in a reactor by exposing the entire hard mask to an etch;
whereby the layer is etched corresponding to the pattern of the hard mask, and the
growth of the layer during the etch is minimized in the portion of the layer corresponding to the
critical dimension.

52. (New) A method according to claim 51, wherein:

allowing the hard mask to react with etch process gases forms a skin on the hard mask.

53. (New) A method for etching a pattern on a workpiece, comprising:

processing a workpiece using etch process gases, the workpiece having a hard mask
deposited over a layer to be etched, which hard mask is comprised of a reactive metal and
defines a pattern; and

allowing the hard mask to react with the etch process gases in order to harden the hard
mask, whereby the layer is etched corresponding to the pattern of the hard mask and the
hardening of the hard mask holds the pattern of the hard mask being etched into the layer.

54. (New) A method according to claim 53, wherein:

the hard mask further defines a pattern including at least one portion having a critical
dimension; and

wherein the growth of the layer during the etch is minimized in the portion of the layer
corresponding to the critical dimension.

55. (New) A method according to claim 53, wherein: